Anatomy for ICD-10-CM
Part 2: Musculoskeletal

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Objectives

• Understand the structure and function of the musculoskeletal system
• Review common terminology
• ICD-10-CM changes in the musculoskeletal system
• Study common diseases and disorders of the musculoskeletal system
Overview

• The musculoskeletal system is actually made up of two separate systems.
• The muscular system is responsible for the movement of the body.
• The skeletal system is responsible for providing support for the body.

Muscular System

• The muscular system makes up about 40% of a man’s body weight and about 23% of a woman’s body weight.
• There are three different types of muscle tissues:
  – Skeletal
  – Cardiac
  – Smooth
Muscular System

- Every muscle has the ability to contract to help the body function.
- The cardiac muscle pumps blood throughout the body.
- Smooth muscles are found in hollow parts of the body:
  - Stomach, intestines, blood vessels, and the bladder

Muscular System

- Skeletal muscles attach to the skeleton to keep bones in place and provides the pulling power to allow us to move around.
- The majority of the skeletal muscles stretch across joints to link two bones together.
Muscular System

• There are approximately 650 skeletal muscles in the body.
• They usually work in groups in response to nerve impulses.
  – Muscles can only pull, they cannot push
  – By working in groups, they allow the same body part to move in different directions.

Muscular System

• The muscles work in pairs that relax and contract to move a joint.
  – Front leg muscles contract when the knee extends (straightens out)
  – Back leg muscles relax when the knee extends (straightens out)
Muscular System

• Muscle contractions that move a body part away from the midline of the body are called abduction.
• Muscle contractions that move a body part toward the midline of the body are called adduction.

Muscular System

• Tendons and ligaments are also part of the muscular system.
  – Tendons are fibrous bands that attach muscle to bone.
  – Made of special cells called tenocytes, water, and fibrous collagen proteins.
  – Creates a permanent bond with the bone that is extremely tough to break.
Muscular System

• Ligaments are fibrous tissue that attach bone to bone.
  • They control range of motion of a joint.
  • Ensure that the bones move in proper alignment.
  • Composed of strands of collagen fibers.
  • Arranged in crossing patterns to prevent the joints from becoming loose, and to maintain stability.

Muscles

• Gastrocnemius muscle
  – Located in the back of the lower leg
  – Runs from the back of the knee to the heel
  – Forms the calf muscle along with the soleus muscle
  – Very prone to spasms; painful involuntary muscle contraction that may last several minutes.
Muscles

- The primary function of the gastrocnemius muscle is plantar flexion (or movement of the foot).
- Also plays a minor role in flexion of the knee (between the 120 and 150 degree range)

Muscles

- Quadriceps
  - Large muscle group of four muscles located on the front of the thigh.
    - Rectus femoris – located in the middle of the thigh and covers most of the other three muscles
    - Vastus lateralis- located on the outer side of the thigh (lateral)
    - Vastus medialis – located on the inner side of the thigh (medial)
    - Vastus intermedius – located deep within the rectus femoris between the other vastus muscles
Muscles

• The strongest and leanest muscle in the body.
• The main functions knee extension and hip flexion.
  • It is a weaker hip flexor when the knee is extended because it is already shortened.
  • It also becomes less dominant in knee extension when the hip is flexed because it is already shortened.

Muscles

• Gluteus maximus
  – Largest and most superficial of the three gluteal muscles.
    • Gluteus maximus
    • Gluteus medius
    • Gluteus minimus
  – Makes up a large portion of the shape and appearance of the buttocks.
Muscles

- Main functions include extending and laterally rotating the hip, and extending the trunk.
- It is the main muscle used in many sports such as hockey, soccer, and football.

Muscles

- Rectus abdominus
  - Located in the abdomen running vertically on either side of the anterior (front) wall.
    - Paired muscle that runs parallel to each other and are separated by a band of connective tissues called the linea alba (white line).
    - Commonly referred to as “six pack” when they are strengthened.
Muscles

• The upper portion is mainly attached to cartilage of the fifth rib.
• Main function is to aide in posture and flexion of the lumbar spine.
• Also helps to keep internal organs intact and assists with breathing.

Muscles

• Trapezius
  – Located in the upper middle back (beginning at the bottom of the skull and extending down to the middle of the back or thoracic region).
  – Three functional regions:
    • Superior region – supports the arm
    • Intermediate region – retracts the scapula
    • Inferior region – medially rotates and depresses the scapula
Muscles

• Pectoralis major
  – Located in the chest area of the body making up the bulk of chest muscles.
  – Located under the breast in a woman.
  – Primarily responsible for movement of the shoulder joint.
  – Also aides in deep inspiration.

Muscles

• Biceps
  – A muscle with two heads located in the upper front portion of the arm.
  – Works across three joints:
    • Proximal radioulnar joint (upper forearm)
    • Humeroulnar joint (elbow)
    • Glenohumeral joint (shoulder)
Muscles

• Main functions are to flex the elbow and to supinate (palm facing up) the forearm.
• Contrary to popular belief, the most powerful flexor of the forearm is actually the deeper brachialis muscle, and not the biceps brachii.

Muscles

• Triceps brachii
  – A muscle with three heads located in the upper back portion of the arm.
  – Three bundles of muscle, each with different origins that join together at the elbow.
  – Primary function is to extend the elbow, and to fixate the elbow joint while the forearm and hand are used for fine motor activities such as writing.
Common Muscular Disorders

• Strains/Sprains/Tears
  – A sprain is an injury to a ligament, which may involve stretching or tearing of the tissue.
  – A strain is an injury to a muscle or tendon, which may simply be an overstretched muscle or a partial or complete tear.
  – Tearing a muscle may also cause damage to small blood vessels resulting in bruising or pain.

ICD-10-CM

• In order to code for strains/sprains/tears in ICD-10-CM the following is necessary:
  – Anatomic site of injury
  – Laterality
  – Type of injury
    • Dislocation
    • Subluxation (partial dislocation of a joint)
    • Sprain
ICD-10-CM

• As with most injuries in ICD-10-CM, the episode of care will also need to be reported
  – Assigned as the seventh character of a code
    • A= initial encounter
    • D= subsequent encounter
    • S= sequela (late effect)

Examples

• Dislocations and sprains are coded to the following categories:
  – S03.- Dislocation and sprain of joints and ligaments of head
  – S13.- Dislocation and sprain of joints and ligaments at neck level
  – S23.- Dislocation and sprain of joints and ligaments of thorax
  – S33.- Dislocation and sprain of joints and ligaments of lumbar spine and pelvis
  – S43.- Dislocation and sprain of joints and ligaments of shoulder girdle
Examples

• Continued
  – S53.- Dislocation and sprain of joints and ligaments of the elbow
  – S63.- Dislocation and sprain of joints and ligaments at wrist and hand level
  – S73.- Dislocation and sprain of joints and ligaments of hip
  – S83.- Dislocation and sprain of joints and ligaments of knee
  – S93.- Dislocation and sprain of joints and ligaments at ankle, foot and toe level

Examples

• Subcategories provide a higher level of specificity, for example:
  – S43.0- Subluxation and dislocation of shoulder joint
    • S43.00- Unspecified subluxation and dislocation of shoulder joint
    • S43.01- Anterior subluxation and dislocation of humerus
    • S43.02- Posterior subluxation and dislocation of humerus
    • S43.03- Inferior subluxation and dislocation of humerus
    • S43.08- Other subluxation and dislocation of shoulder joint
Examples

• Further classification identifies laterality and distinguishes between subluxation and dislocation.
  – S43.011- Anterior subluxation of right humerus
  – S43.012- Anterior subluxation of left humerus
  – S43.013- Anterior subluxation of unspecified humerus
  – S43.014- Anterior dislocation of right humerus
  – S43.015- Anterior dislocation of left humerus
  – S43.016- Anterior dislocation of unspecified humerus

Episode of care

• A seventh character extension is also required for the codes in this section.
• The appropriate choices are:
  – A= initial encounter
  – D= subsequent encounter
  – S= sequela
Skeletal System

- The skeletal system involves all the bones in the body.
- There are four general categories:
  - Long bones
  - Short bones
  - Flat bones
  - Irregular bones

Skeletal System

- Long bones are longer than they are wide and work as levers.
  - Femur, humerus, and tibia
- Short bones are as wide as they are long to provide support and stability with little movement
  - Carpals (wrist bones), and tarsals (foot bones)
Skeletal System

- Flat bones are strong, flat plates of bone that provide protection to vital organs of the body.
  - Scapula (shoulder blade), sternum (breast bone), cranium (skull), pelvis, and ribs.
- Irregular bones are cancellous bones with varied shapes, sizes, and surface features.
  - Vertebrae, sacrum, and mandible (lower jaw).

Skeletal System

- There are 206 bones in the human body.
- 80 of them are axial bones meaning they are located close to or along the central axis of the body.
  - Head, facial, hyloid, auditory, trunk, ribs, and sternum.
Skeletal System

• 126 of them are appendicular bones meaning they are related to movement and are “appended” to the axial structure.
  – Arms, shoulders, wrists, hands, legs, hips, ankles, and feet.

Skeletal System

• Joints
  – There are many joints located throughout the body.
  – The way the body moves depends on each joint individually.
  – Three major types:
    • Immovable
    • Partly movable
    • Synovial
Skeletal System

• Immovable joints, like those connecting the cranial bones, have edges that interlock tightly.
• Partly movable joints allow some degree of flexibility and usually have cartilage between the bones such as vertebrae.
• Synovial joints allow for the greatest degree of flexibility and are covered with connective tissue at the ends which is filled with synovial fluid.

Skeletal System

• Ball-and-socket joints
  – The spherical head of one bone fits into the spherical cavity of another bone.
• Hinge joints
  – Allow movement in only one direction and are considered the simplest type of joint.
• Gliding joints
  – Permit a wide range of mostly sideways movements.
Skeletal System

• Pivot joints
  – Allow twisting movements, such as in the wrist and ankle.

• Saddle joint
  – Allows movement in two directions allowing the thumb to cross over the palm of the hand.

Skeletal System

• Spine
  – Made up of approximately 33 bones called vertebrae.
  – Each pair of vertebrae is connected by a joint to stabilize the vertebral column and allow movement.
  – Between each vertebra there is fibrous cartilage with a jelly-like core, called the disk, which cushions the movement of the spine.
Skeletal System

• The spine encloses and protects the spinal cord, which is a column of nerves that run from every area of the body to the brain.
• The spine is divided into four major sections:
  – Cervical, thoracic, lumbar, and sacral

Spine

• Cervical region (neck)
  – Has 7 vertebrae – C1 – C7
• Thoracic region (upper back)
  – Has 12 vertebrae – T1 – T12
• Lumbar region (lower back)
  – Has 5 vertebrae – L1 – L5
• Sacral region (bottom of spine)
  – Series of 5 bony segments fused together – S1 – S5
Spine

- Discs of the spine are always labeled by the vertebrae that they lie between.
  - C1 – C2 disc lies in the neck area between first and second vertebrae in the cervical spine.
  - L5 – S1 disc lies between the L5 vertebrae and the first bony segment at the top of the sacrum or S1.

Fractures

- Classifications of fractures.
  - In ICD-10-CM, a fracture that is not indicated as open or closed is coded as closed.
    - An open fracture is one where the fracture caused the bone to break through the skin.
  - A fracture that is not indicated as displaced or nondisplaced is coded as displaced.
    - A displaced fracture is where the bones separate from each other at the fracture site making it impossible for them to heal anatomically correct without surgical intervention.
Fractures

• Some fracture codes in ICD-10-CM require the type of fracture to be documented to assign the most appropriate code.

• A greenstick fracture is where the bone is broken but not completely separated, also known as an incomplete fracture.

Fractures

• A transverse fracture is a straight break line across the bone.

• A spiral fracture is where the break spirals around the bone, which is common in a twisting injury.

• An oblique fracture is where there is a diagonal break across the bone.
Fracture

- A compression fracture is where the bone is crushed, such as a collapse in the vertebrae.
- A comminuted fracture is where the bone is splintered or broken into a number of pieces.
- A segmental fracture is where large pieces of bone separate from the main fracture area.

Open fractures

- In ICD-10-CM, open fractures will be classified according to the Gustilo open fracture classification system.
- The system classifies open fracture into three main categories to indicate the mechanism of injury, soft tissue damage, and the degree of skeletal involvement.
Open fractures

- Type I
  - The wound is less than 1 cm with minimal soft tissue injury, and usually involves a simple fracture.

- Type II
  - The wound is greater than 1 cm with moderate soft tissue injury, and usually involves a simple fracture.

- Type III
  - Extensive damage to soft tissue, including muscle, skin, and neurovascular structures, and are usually accompanied by a high velocity injury or severe crushing component.

- Type IIIA
  - High energy trauma with adequate soft tissue coverage despite soft tissue laceration, and usually involves a severe fracture.

- Type IIIB
  - Extensive soft tissue loss with bony exposure, and usually associated with massive contamination.

- Type IIIC
  - Major arterial injury requiring repair for limb salvation.
Episode of care

• Fracture codes require the use of a seventh character extension to indicate the episode of care.
• Earlier three options for the seventh character were reviewed.
  – A, D, and S

Episode of care

• When coding in the fracture section in ICD-10-CM, it is important to refer to the appropriate area indicating the options that are available in each section, because they will vary.
• The most common choices available are the ones that we have already discussed.
Episode of care

• A fracture of the clavicle has 7 choices for a seventh character, while a fracture of the shaft of the radius has 16 choices for a seventh character.

• The choices are represented in a shaded pink box so it is important to make sure you are always in the corresponding box to the category of code you are coding from.

Examples

• Seventh character options for category S52. Fracture of shaft of radius:
  - A initial encounter for closed fracture
  - B initial encounter for open fracture type I or II
    initial encounter for open fracture NOS
  - C initial encounter for open fracture type IIIA, IIIB, or IIIC
  - D subsequent encounter for closed fracture with routine healing
  - E subsequent encounter for open fracture type I or II with routine healing
Examples

• Continued
  – F subsequent encounter for open fracture type IIIA, IIIB, or IIIC with routine healing
  – G subsequent encounter for closed fracture with delayed healing
  – H subsequent encounter for open fracture type I or II with delayed healing
  – J subsequent encounter for open fracture type IIIA, IIIB, or IIIC with delayed healing
  – K subsequent encounter for closed fracture with nonunion
  – M subsequent encounter for open fracture type I or II with nonunion

• Continued
  – N subsequent encounter for open fracture type IIIA, IIIB, or IIIC with nonunion
  – P subsequent encounter for closed fracture with malunion
  – Q subsequent encounter for open fracture type I or II with malunion
  – R subsequent encounter for open fracture type IIIA, IIIB, or IIIC with malunion
  – S sequela
Fractures

- Fractures are coded to the following categories:
  - S02.- Fracture of skull and facial bones
  - S12.- Fracture of cervical vertebra and other parts of neck
  - S22.- Fracture of rib(s), sternum and thoracic spine
  - S32.- Fracture of lumbar spine and pelvis
  - S42.- Fracture of shoulder and upper arm
  - S52.- Fracture of forearm
  - S62.- Fracture at wrist and hand level

- Continued
  - S72.- Fracture of femur
  - S82.- Fracture of lower leg, including ankle
  - S92.- Fracture of foot and toe, except ankle

- Subcategories provide a higher level of specificity, for example:
  - S52.3- Fracture of shaft of radius
Fractures

• Further classification identifies the type of fracture:
  – S52.30 - Unspecified fracture of shaft of radius
  – S52.31 - Greenstick fracture of shaft of radius
  – S52.32 - Transverse fracture of shaft of radius
  – S52.33 - Oblique fracture of shaft of radius
  – S52.34 - Spiral fracture of shaft of radius
  – S52.35 - Comminuted fracture of shaft of radius
  – S52.36 - Segmental fracture of shaft of radius
  – S52.37 - Galeazzi’s fracture
  – S52.38 - Bent bone of radius
  – S52.39 - Other fracture of shaft of radius

Fracture

• When coding for fractures it is also important to specify laterality:
  – S52.311 - Greenstick fracture of shaft of radius, right arm
  – S52.312 - Greenstick fracture of shaft of radius, left arm
  – S52.319 - Greenstick fracture of shaft of radius, unspecified arm
Example

- A patient presents to the ER for a displaced greenstick fracture of the shaft of the left radius.
  - The correct ICD-10-CM code is S52.312A, Greenstick fracture of shaft of radius, left arm, initial episode of care for a closed fracture.

Example

- A patient was involved in an auto accident and arrived in the ER with severe pain in the upper right arm. X-rays revealed a comminuted fracture of the shaft of the right humerus.
  - ICD-10-CM code is S42.351A, Displaced comminuted fracture of shaft of humerus, right arm, initial encounter for closed fracture.
Pathological Fractures

• A pathological fracture is a broken bone caused by a disease that lead to the weakness of the bone.
• Most commonly due to osteoporosis, but may also be caused by cancer, infection, inherited bone disorders, or a bone cyst.

Pathological Fractures

• The following subcategories represent pathological fractures in ICD-10-CM:
  – M80.0- Age-related osteoporosis with current pathological fracture
  – M80.8- Other osteoporosis with current pathological fracture
  – M84.4- Pathological fracture, not elsewhere classified
  – M84.5- Pathological fracture in neoplastic disease
  – M84.6- Pathological fracture in other disease
Pathological Fractures

• In order to select the most appropriate code for a pathological fracture in ICD-10-CM, the following is necessary:
  – Anatomic site of the fracture
  – Laterality
  – Underlying condition
  – Episode of care (assigned as the seventh character extension)

Seventh Character Extension

• Occasionally, a code will require a seventh character extension when the code is only five characters in length.
• In these cases it is necessary to use a dummy place holder of X to expand the code out to six characters.
Example

- Code M84.58-, Pathological fracture in neoplastic disease, vertebrae, requires a seventh character extension.
  - M84.58XA, Pathological fracture in neoplastic disease, vertebrae, initial encounter for fracture.

Unspecified Codes

- ICD-10-CM will continue to have unspecified codes available for use, and should only be used in cases where it is extremely difficult to obtain additional information from the provider or the patient.
- 99214 billed with ICD-10-CM code S46.319A, Strain of muscle, fascia and tendon of triceps, unspecified arm, initial encounter.
Documentation

• One thing that will not change with ICD-10-CM implementation is the need for increased specificity in documentation.
• If providers are not aware of what information is necessary, they are not likely to provide it.
• Provider education will be vital to ensure a successful transition to coding in ICD-10-CM.

Conclusion

• It is easy to see that ICD-10-CM will bring many challenges and require a large amount of education to ensure a smooth transition to this new way of coding.
• ICD-10-CM implementation is not a hurdle that we have to overcome, it is an opportunity to improve the way diseases are reported in the United States, which may lead to better patient outcomes and the discovery of new cures for diseases in the future.
THANK YOU!

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